

Management Information System
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Week - 05
Module – 02
Lecture – 21
Information Systems for
Manufacturing Management (Contd.)

Hi, welcome to module 2 of week 5 – ‘Information Systems for Manufacturing Management’! We will start from where we had left the other day and we will continue on with the concepts of information systems which are used for supporting the production management or manufacturing management function.

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Information Systems for Manufacturing Management

❖ **Capacity Planning:**

- Capacity refers to the ability to produce output per time period.
- Capacities can be allocated to work centres or resources.
- Capacity requirements specify how much capacity is required for individual orders at a specific time.
- Capacity Requirement Planning is a tool for determining available capacity and capacity requirements, and for carrying out capacity levelling.

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We had discussed about materials requirement planning in the last section. Now having decided on what is the net requirement for an item that needs to be produced ok. The manufacturing manager would obviously like to know that whether they have got the requisite capacity to generate that production and hence another important function of manufacturing management is capacity planning.

So for capacity planning, they also require some information and those information is basically being supported by information systems for manufacturing management.

So, when we discuss about capacity planning, we need to know: what is capacity? So, capacity basically refers to the ability to produce output per time period; capacities can be allocated to work centres that is machines or even any other type of resources; capacity requirements specify how much capacity is required for individual orders at a specific time.

So, capacity requirement planning is basically a tool for determining available capacity and capacity requirements and for carrying out capacity leveling. That means, if we do not have the requisite capacity to generate the amount of production which is required. Whether we will hire some extra capacity we will buy some extra machines or we will outsource some of these requirements to some external supplier.

So, you need to balance the requirement with the availability and that is basically one portion of capacity leveling. Also capacity leveling means how do I schedule my production such that I maintain an uniformity in doing that the scheduling will require some information. Now that information is generated from the manufacturing management information system.

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The slide is titled "Information Systems for Manufacturing Management". It features a background with a stylized tree of nodes and icons representing manufacturing processes. The slide is divided into two main sections:

- Production Control:** This function helps maintain quality of the products by keeping a close eye on activities such as ordering, follow-ups, and inventory control.
- Product Design:** This function deals with all the activities that give shape to the product.

In the bottom right corner, there is a small inset video of a man in a white shirt and red tie. At the bottom of the slide, there are logos for NPTEL and IIT Kharagpur, along with the text "NPTEL Online Certification Course IIT Kharagpur".

Another important function which is supported by this kind of information systems is for production control operation. Now what is production control operation? This production control function helps maintain quality of the products by keeping a close eye on activities such as ordering, follow up on those order and inventory control.

Manufacturing management information systems also provide support for product design.

The production product design function deals with all the activities that give shape to a particular product and for that also information is required, which is being facilitated by the manufacturing management information system.

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Information Systems for Manufacturing Management

❖ **Computer Aided Design (CAD):**

- This subsystem automates
 - ✓ the creation and
 - ✓ revision of designs,
- using computers and sophisticated graphics software.

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Now we come on to the topic of computer aided design, this is also embedded or interfaced with manufacturing management information systems. The computer aided design subsystem basically automates the creation and revision of product designs using computers and sophisticated graphics software.

Now this particular topic is relevant because new product design or modification of existing products is an important input for the manufacturing management function for which information support is required and this is being provided by this production information systems or manufacturing information system.

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Information Systems for Manufacturing Management

❖ **Computer Aided Design (CAD):**

- Using a more traditional physical design methodology,
- ❑ each design modification requires
 - ✓ a mould to be made and
 - ✓ a prototype to be tested physically.

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When we talk about CAD, we need to know: what are the advantages that are gained from it? Because using a more traditional physical design methodology, each new product design or design modification requires a mould to be made and a prototype to be tested physically.

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Information Systems for Manufacturing Management

❖ **Computer Aided Design (CAD):**

- This process is repeated many times
 - ✓ which is very expensive and
 - ✓ time consuming

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Now, if we do that what will happen? There will be a process of iteration, because it may not be right the first time. So, every time if you have to make a mould test it and this

process is repeated many times lot of expenses will be incurred, lot of time will be consumed in the process. So, we need to get rid of that.

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Information Systems for Manufacturing Management

❖ **Computer Aided Design (CAD):**

- Using a CAD workstation,
- ✓ the designer need only make a physical prototype toward the end of the design process
- ✓ because the design can be
 - ☐ easily tested and
 - ☐ changed on the computer

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So, using a CAD workstation the designer need only make a physical prototype towards the end of the design process, because the design can be easily tested and changed on the computer.

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Information Systems for Manufacturing Management

❖ **Computer Aided Design (CAD):**

- For example, Ford Motor Company used a computer simulation
- ✓ to create an engine cylinder that came up with the most efficient design possible
- CAD systems have also provided many benefits to companies like
 - ✓ Tata Motors as well as
 - ✓ Jaguar Land Rover

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For example ford motor company used a computer simulation through this CAD system to create an engine cylinder that came up with the most efficient design possible.

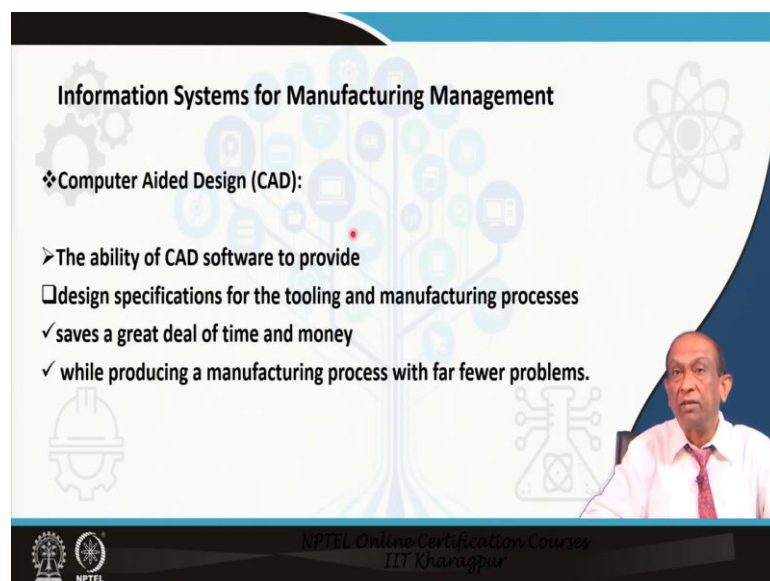
Similarly, CAD systems have also provided many benefits to companies like Tata motors as well as Jaguar Land Rover; ok.

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So, here we show a slide where the design of engine components using CAD systems is being shown. It saves time; it saves cost; as a result, the time to market for a new product or a new variant of a say, automotive is minimized. So, there is minimization of time so you can launch this product faster in the market at a much less cost.

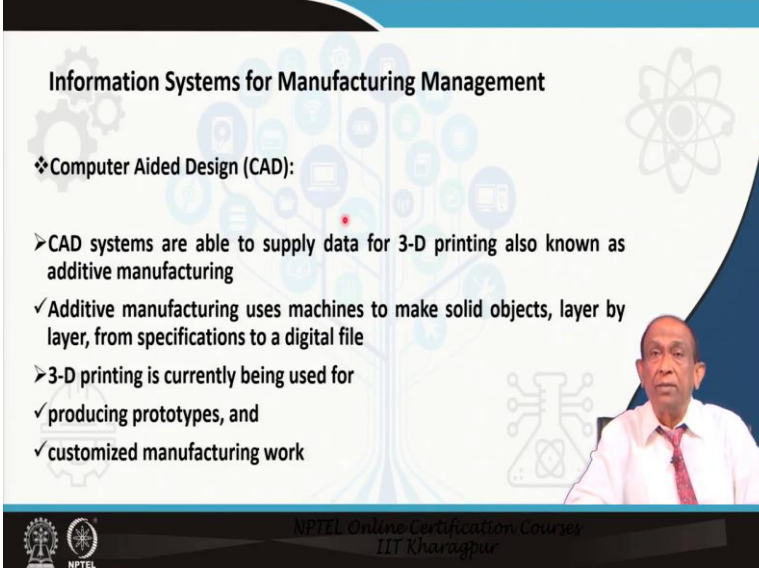
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So, this ability of CAD software to provide design specifications for the tooling and manufacturing processes saves a great deal of time and money, while producing a manufacturing process with far fewer problems.

And hence this kind of subsystem is either embedded in the manufacturing management system information system or interfaced with this kind of MIS. Nowadays, different types of MIS are integrated in terms of enterprise resource planning systems, about which something has been delivered to you or will be delivered in subsequent modules. And in real life we find that interfaces have been developed between this CAD system and the ERP systems in a seamless manner computer added systems.

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Information Systems for Manufacturing Management

❖ **Computer Aided Design (CAD):**

- CAD systems are able to supply data for 3-D printing also known as additive manufacturing
- ✓ Additive manufacturing uses machines to make solid objects, layer by layer, from specifications to a digital file
- 3-D printing is currently being used for
- ✓ producing prototypes, and
- ✓ customized manufacturing work

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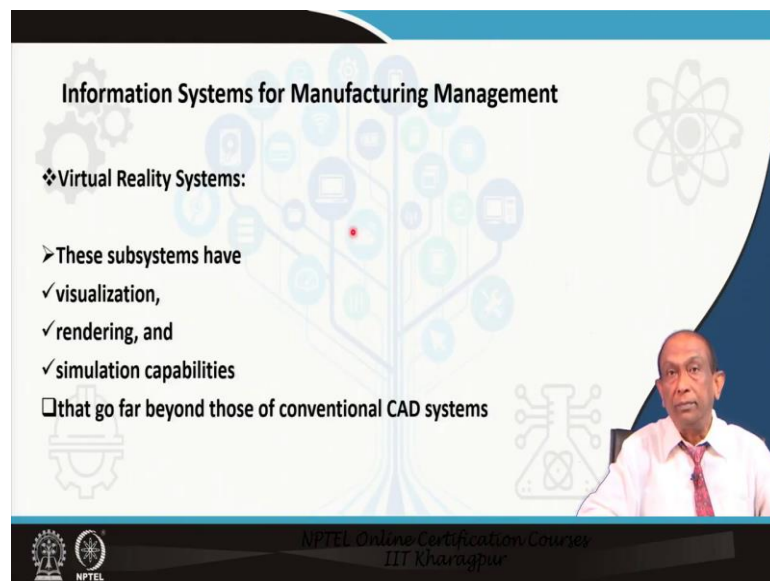
So, computer aided design systems basically also supply data for three dimensional printing 3D printing. In manufacturing management this is also known as additive manufacturing. So, CAD systems support additive manufacturing. Additive manufacturing uses machines to make solid objects layer by layer from specifications to a digital file. Additive manufacturing is currently being used for producing prototypes and customized manufacturing work.

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See this output is being generated through additive manufacturing systems.

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Then we talk about another kind of subsystem which is popularly known as virtual reality systems. These subsystems also play a very important role in providing support for manufacturing operations. This virtual reality systems have visualization, rendering and simulation capabilities that go far beyond the capabilities provided by conventional CAD systems.

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Information Systems for Manufacturing Management

❖ **Virtual Reality Systems:**

- These systems use
 - ✓ interactive graphics software to
 - ✓ create computer generated simulations
 - that are so close to reality that users almost believe they are participating in a real-world situation

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The slide features a background with a stylized tree of icons representing various manufacturing and technology concepts. A small inset video of a man in a white shirt and red tie is visible in the bottom right corner of the slide area.

Virtual reality systems are interactive graphics software to create computer generated simulations that are very close to a reality.

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Information Systems for Manufacturing Management

❖ **Virtual Reality Systems:**

- In many virtual reality systems, the user dons
 - ✓ special clothing,
 - ✓ headgear, and
 - ✓ equipment depending on the application

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The slide features a background with a stylized tree of icons representing various manufacturing and technology concepts. A small inset video of a man in a white shirt and red tie is visible in the bottom right corner of the slide area.

In here, users get an idea or users almost believe that they are participating in a real world situation. In many virtual reality systems, the user wears a dons special clothing, headgear and equipment depending on the application that they are visualizing.

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Information Systems for Manufacturing Management

❖ **Virtual Reality Systems:**

- These clothing contains
 - ✓ sensors that record the user's movements and
 - ✓ immediately transmit the information back to the computer

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Now those special clothing's which are being worn by the user contains sensors, that record every movement of the users and not only it records but also immediately transmits that information back to the computer.

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Information Systems for Manufacturing Management

❖ **Virtual Reality Systems:**

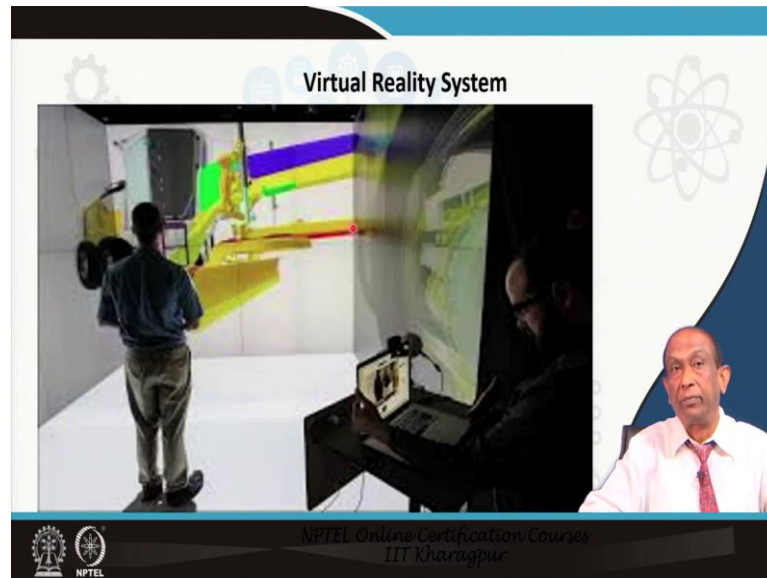
- For example, to walk through a virtual reality simulation of a house,
 - ✓ you would need special clothing that monitors the movement of your feet, hands, and head
 - ✓ you will also need
 - goggles containing video screens, and
 - sometimes audio attachments, and
 - feeling gloves
 - so that you can be immersed in the computer feedback

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For example to work through a virtual reality simulation of a house, the user would need special type of clothing which will monitor the movement of the users feet hands and head. The user may also need special type of goggles containing video screens and

sometimes those goggles might also contain some audio attachments and feeling gloves. So, that the user can get grossly immersed in the computer feedback.

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You see this slide basically shows the capability or the scope of the virtual reality system. The user in here basically is donning special clothings.

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Thus the manufacturing management information system helps a firm accomplish all those objectives as mentioned before. We have not mentioned all the objectives, but we

have basically enlisted some of the important goals of a manufacturing management function which are being supported by such kind of information system.

Now in a highly dynamic business environment with complex production processes, volumes of data which are required are massive. And manufacturing management system stores and manages this huge volume of complex data, it processes that data and guides the managers in achieving effective control of production activities.

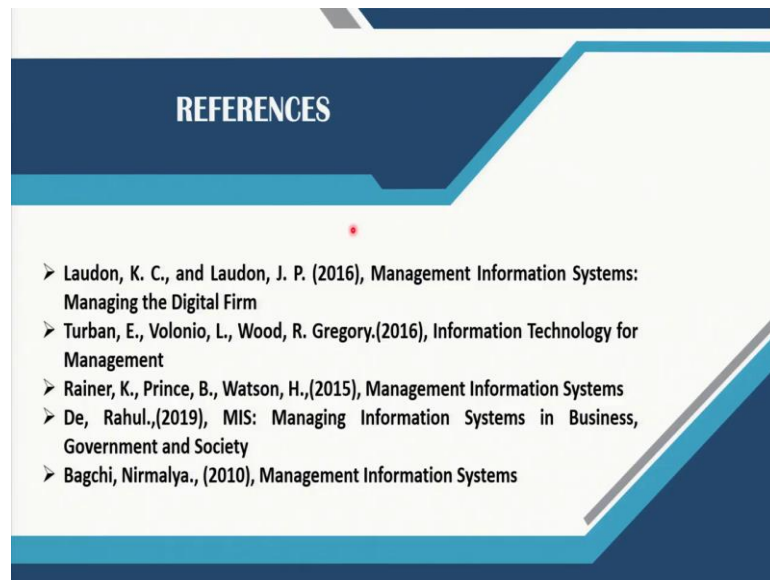
As for example, the inventory control system which is also known as stock control system is a part of manufacturing management information system and this makes it easy to manage inventory automatically.

And we will discuss about all this when we discuss about information systems to support, materials management function this materials management function is also very closely linked with this manufacturing management function. And if you look at enterprise planning systems resource planning systems like SAP or oracle you will find that, this kind of MIS which was previously used in isolated manners no longer exists.

All this different functions information systems to support functions like say manufacturing management, materials management, finance and costing, quality maintenance function everything is integrated together ok. So, today information systems means is the integrated information systems today people do not talk about information systems for an isolated function.

But we are discussing the information systems for this separate function because even though we integrate, we must get to know that what are the facilities and advantages and primary features of those integrated systems are; how those integrated systems support each and every function; ok. And these are the references that I have used for this particular module.

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Thank you all!